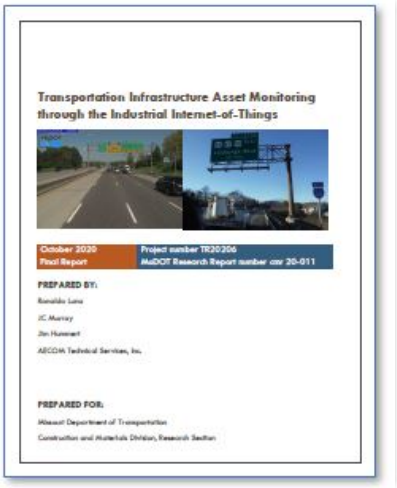
For more information contact: Jennifer Harper (573) 526-3636

Research Summary

Transportation Infrastructure Asset Monitoring through the Industrial Internet-of-Things



The Internet-of-Things (IoT) is a technology that has been growing since its inception in 2009 and as wireless technology becomes more ubiquitous, so are its applications. This technology is dependent on sensors that enable things to gather information and communicate them to other devices, computers and eventually humans. The sensors can vary from simple thermocouples to more advanced electro-mechanically devices, such as accelerometers.

Even though this technology started with consumer applications, it has entered many industrial applications in factories, utilities, and smart cities. Recently these applications are being referred as the Industrial Internet of Things (IIoT). The research goal of this study is to explore the current status and viability of the IIoT technology for the purpose of asset management of transportation infrastructure or the actual built infrastructure distributed along the highway system in the state of Missouri.

This research project was framed by MoDOT in two phases. Phase 1 focus was on preliminary research to assess the readiness of IIoT for initial implementation on the transportation highway system (such as: bridges, pavements, retaining walls, signs, etc.). Phase 2 will implement a pilot study on a limited number of structures to physically evaluate the technology. This report is the result of Phase 1, which summarizes the findings during this period.

The use of IIoT is emerging and dynamic, considering that about half of those who responded to a survey administered to US State Departments of Transportation (DOTs) are evaluating the technology and 30% have used it to some degree, mainly on vehicles and Transportation Management System (TMS) devices, not for asset management. In comparison, the Missouri DOT is very similar to the national trends, and the desire to stay ahead and consider new technologies is noted in the status of the TMS portal and this research project.

> *"The use of IIoT is emerging and dynamic ..."*

The civil infrastructure instrumentation and the IIoT telecommunications industries have been working towards the objective of providing continuous monitoring, and their applications are converging and overlapping as they respond to the needs of customers. The fact is that sensors will become more wireless, smart, and connected over time. The installation of such an IIoT system is new for the application of asset management and the Missouri DOT is at the forefront in the adoption of this technology. It is

the opinion of the research team that this technology is mature enough to implement in a pilot study for the highway system.

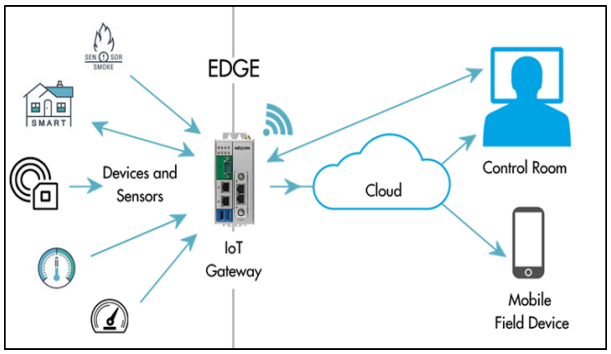


Figure 1: An IoT Gateway and Edge Computing (Assured Systems, 2020)

Project Information

PROJECT NAME: TR202006—Transportation Infrastructure Asset Monitoring through the Industrial Internet-of-Things

PROJECT START/END DATE: October 2019-July 2020

PROJECT COST: $60,000

LEAD CONTRACTOR: AECOM Technical Services, Inc.

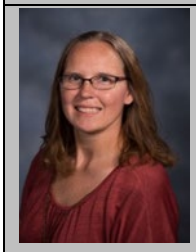
PRINCIPAL INVESTIGATOR: Ronaldo Luna

REPORT NAME: Transportation Infrastructure Asset Monitoring through the Industrial Internet-of-Things

REPORT NUMBER: cmr 20-011

REPORT DATE: October 2020

Project Manager



CONTACT INFORMATION:

Jennifer Harper
Research Director
Missouri Dept. of Transportation
1617 Missouri Blvd.
Jefferson City, MO 65109
(573) 526-3636
Jennifer.Harper@modot.mo.gov